To check that R is stably finite, suppose $R^n \cong R^n \oplus L$, where L is some R-module. By assumption, $L \cong R^s$ for some s, so IBN yields n = n + s. Thus, L = 0, and we have checked that R^n is Dedekind-finite for any n; that is, R is stably finite. The fact that R satisfies the rank condition is straightforward.